could involve multiple truck trips per week relative to one trip per week in 2001 based on a long-term increase in on-site employees.

The current water system can accommodate additional buildings and associated office areas and restroom facilities with the addition of an underground pipe that would be installed from new buildings to the nearest domestic water loop. This improvement would be included in individual building designs.

4.11.4 Sewage

The Proposed Action would increase demand on existing septic tank and leach field systems in proportion to on-site employment growth. Increased demand would include improvements associated with new buildings and other improvements. These improvements are expected to involve additional septic tank and leach fields, as necessary. The size of each septic tank and leach field would be based on maximum staffing at each facility and associated soil conditions. Existing and proposed systems to address site needs adequately and would satisfy State requirements.

4.11.5 Emergency Response and Fire Protection

The new facilities and additional staff associated with the Proposed Action would incrementally increase demand for police, fire and ambulance services, but the increases would be considered minor given site use and anticipated needs for emergency service providers.

The Proposed Action would not increase the risk of wildfire on the site, but it would result in the installation of new facilities, equipment, and buildings, as well as the presence of additional people. The NREL Fire Protection Program currently addresses this risk and other fire risks. The Proposed Action includes fire hydrant requirements and new underground piping to protect new and existing facilities, buildings, equipment and personnel. No off-site infrastructure requirements would be needed, and the capacity of on-site and local infrastructure and local service would not be disrupted by the proposed improvements or new demands for fire protection services.

4.11.6 Impacts of the No Action Alternative

The No Action Alternative would limit demand growth for public services and utilities by retaining existing employment levels and operational activity at current levels. New buildings, machines and equipment would not be added. Incremental capacity impacts on existing service providers caused by the Proposed Action and the impacts of associated infrastructure improvements would be avoided.

MITIGATION MEASURES

There are no significant impacts; therefore no mitigation measures are required under NEPA.

4.12 ENERGY EFFICIENCY AND RENEWABLE ENERGY

The Proposed Action has a complex impact on energy because it will increase on-site energy demand, generate electricity for use on-site, may generate some electricity for distribution

through the regional energy grid and is expect to contribute substantially to nationwide and possibly global use of energy efficiency and renewable energy technology. Overall, the Proposed Action has a beneficial impact on energy efficiency and renewable energy. The following discussion addresses two primary energy impacts of the Proposed Action:

- Electricity Generation for the Site and Regional Grid; and
- Contribution Toward Energy Efficiency and Renewable Energy Technology.

The impacts of the Proposed Action on electricity and gas demand and associated infrastructure is discussed in Section 4.11 Public Utilities and Services.

4.12.1 Electricity Generation for the Site and Regional Grid

The Proposed Action increases the potential for the site to provide electricity for a portion of its own needs and includes the possibility of negotiating an agreement to occasionally add electricity to the regional power grid. This is a beneficial impact of the proposed action.

The possibility that the site could become a “power plant” by exporting more electricity than is imported on a sustained basis is extremely remote because wind conditions are highly inappropriate for efficient and sustained wind power generation and the NWTC is a laboratory designed for intermittent operations and temporary testing configurations. Given fluctuating and uncertain operational parameters, annual energy consumption is expected to exceed annual energy generation by a considerable margin during the life of the NWTC. The NWTC is not and is not intended to become a renewable energy generation plant.

It is important to note that the net energy requirement at the NWTC has no implications relative to the feasibility of wind or solar power as efficient power generation sources.

4.12.2 Contribution Toward Energy Efficiency and Renewable Energy Technology

The Proposed Action is fully intended to make a substantial contribution to energy efficiency and renewable energy technology including advances in wind power and distributed energy resources. The magnitude of these beneficial impacts could range from minor to globally significant depending on the technology achievements resulting from the Proposed Action and related efforts worldwide. Clearly, improvements in technology and corresponding cost-effectiveness since the mid-1970’s have been substantial, and current energy pricing scenarios and research prospects indicate that further advances may be substantial.

These direct benefits would also result in indirect and/or secondary beneficial impacts to the environment including, but not limited to reduced air pollution as compared to emissions generated with conventional energy technologies.

4.12.3 Impacts of the No Action Alternatives

The No Action Alternative would maintain the NWTC’s energy production capacity and energy consumption at current levels. Beneficial energy impacts and corresponding environmental impacts would still be anticipated, but these benefits would be less substantial than those associated with the Proposed Action.

MITIGATION MEASURES

There are no significant impacts; therefore no mitigation measures are required under NEPA.

4.13 SUMMARY OF SECONDARY AND CUMULATIVE IMPACTS

Secondary impacts are those that are caused by a Proposed Action, but may occur later in time or farther removed in distance, relative to the primary impacts of the Proposed Action. “Cumulative impacts result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions" (40 CFR Section 1508.7).

This Site-Wide EA considers past, present and reasonable foreseeable short-term and long-term future actions on the site. In addition, it considers off-site factors and reasonably foreseeable off-site projects.

Reasonably foreseeable off-site projects considered in the cumulative impacts analysis include ongoing aggregate mining in the site vicinity and a wide range of land development in the communities east of the site and along Highway 93.

Cumulative and secondary impacts are discussed in Sections 4.1 through 4.12, as appropriate. The most important examples of secondary and cumulative impacts associated with the Proposed Action are as follows:

- Traffic congestion at the Highway 93/128 intersection;
- Regional and local air pollutant emissions;
- Front range development intensification and changing landscapes;
- Habitat conversion and increased mortality risk for wildlife and plant habitats;
- Demand for energy; and
- Beneficial impacts from improved alternative energy sources.

As stated in Chapter 4, the Proposed Action’s incremental impact on these secondary and cumulative impacts would be insignificant and the No Action alternative would not contribute to these impacts. Cumulative impacts are important to identify, but characterizing their significance is difficult because to some degree these impacts are speculative and may or may not be addressed or mitigated by entities with discretionary authority over reasonably foreseeable projects or efforts that are not foreseeable today. One example would be interim and long-term measures to address congestion issues at the Highway 93/128 intersection. Future plans call for an interchange at this location, but no funding or schedule commitments are currently in place.

4.14 IRREVERSIBLE/IRRETRIEVABLE COMMITMENT OF RESOURCES

An irreversible commitment of resources is defined as the loss of future options. The term applies primarily to the effects of use of nonrenewable resources such as minerals or cultural resources, or to those factors such as soil productivity that are renewable only over long periods. It could also apply to the loss of an experience as an indirect effect of a "permanent" change in the nature or character of the land. An irretrievable commitment of resources is defined as the loss of production, harvest, or use of natural resources. The amount of